# A METHOD AND APPARATUS TO AID IN THE DELUBRIFICATION OF PARTS

## REFERENCE TO RELATED APPLICATIONS

This application claims an invention which was disclosed in Provisional Application Number 60/450,934 , filed February 28, 2003, entitled "A METHOD AND APPARATUS TO AID IN THE DELUBRIFICATION OF PARTS". The benefit under 35 USC §119(e) of the United States provisional application is hereby claimed, and the aforementioned application is hereby incorporated herein by reference.

## BACKGROUND OF THE INVENTION

### FIELD OF THE INVENTION

The invention pertains to the field of continuous or batch furnaces. More particularly, the invention pertains to an apparatus added to a continuous or batch furnace to aid in the delubrification of materials or parts.

### DESCRIPTION OF RELATED ART

Prior art pre-sintering furnaces consists of three heating zones and a cooling section. The prior art furnaces are approximately 520 inches long. While these furnaces are useful for pre-sintering parts they are not sufficient in removing lubrication from parts of larger mass or of large quantity.

The prior art furnace shown in figure 1 is comprised of a hood (10), three zones (12, 14, 16), and a cooling section (18). Parts enter the hood (10) and move through the furnace on a belt (not shown) in the direction marked by arrow (20). Slow removal of vapor and gas products away from the surface of the parts due to the inadequate length of the furnace causes soot deposits to form on the exterior surface of the parts that have at least one lubricant present. After the soot has been deposited on the exterior surface of the parts, the parts move into zone 3, where the temperature increases significantly to 1400-1650°F for pre-sintering, hardening the soot onto the parts.

## SUMMARY OF THE INVENTION

A method and apparatus for delubrification of parts. The method comprising the steps of moving the parts on the belt into a chamber of the furnace, heating the parts, igniting the unused combustible atmosphere above the parts, and allowing the atmosphere above the parts to escape through a vent in the chamber. The parts are heated uniformly by a heat source beneath the belt. The hot atmosphere is forced up through at least one plenum by blowers. The unused combustible atmosphere in the chamber above the parts on the belt is ignited using a burner and vented through the vent in the chamber.

## BRIEF DESCRIPTION OF THE DRAWING

Fig. 1 shows a prior art continuous or batch furnace.

Fig. 2 shows a furnace of the present invention.

Fig. 3 shows a close up of the present invention.

Fig. 4 shows a close up of the prior art continuous or batch furnace.

## DETAILED DESCRIPTION OF THE INVENTION

Prior art figure 4 shows a close up of the conventional batch or continuous furnace shown in Figure 1. A conventional hood or vent (10) is located directly adjacent to zone 1 for pre-sintering. The driving means (40) that controls belt movement is located directly beneath the belt (31).

Referring to figure 2, the furnace of the present invention comprises a hood or vent (30) having an extended chamber adjacent to the three zones (12, 14, 16) and the cooling section (18). Parts move through the furnace in the direction marked by arrow (32).

Figure 3 shows a close up of the present invention. Parts that need to be pre-sintered are placed on belt (31) and moved through the furnace in the direction marked by arrow (32). The belt (31) can first be heated with a belt warmer (43) present underneath the belt (31). The belt warmer (43) is preferably an electric element that heats up to 100° to 1500°F. The belt warmer (43) and plenums (46) are surrounded by a heat shield (44).

The heating of the belt (31) increases the effectiveness of the delubrification process since the belt (31) will have already have been heated and will not absorb any of the heat intended for the parts.

After the belt has been warmed sufficiently, the parts are moved through the hood (30). The hood (30) having an extended chamber in which the parts undergo the delubrification process aids in removing the vaporizing lubricant away and out of the furnace. A pilot burner (41) is also present within the furnace to ignite the unused combustible atmosphere flowing from Zone 1, 2, and 3 of the furnace and the plenums (46). The flame from the ignition of the combustible atmosphere will form an additional heat source above the parts. Likewise, it will also finish burning the lubricant as it is carried away from the parts and up the stack. A separate chamber between a conventional hood and zone 1 may also be used. Furthermore, modifications made to the hood are not limited to the shape shown in the figures. Other heating elements may include but are not limited to stack burners and ribbon burners instead of the pilot burner shown. Modifications to the size and the shape of the chamber are not limited to the shape shown in the figures. How the chamber is created may include but is not limited to curtains or sample ports used to create the separate chamber prior to zone 1.

Adjacent to the belt warmer is a plurality of plenums (46) spanning the length of the hood (30), which for this application is preferably 45". The plenums (46), which can vary in size and number are surrounded by a heat shield (44). The heat shield (44) protects the driving means (40) controlling belt movement. The plenums (46) rest in trays which pull out from the side for easy cleaning. Above the plenums (46) are slots (48) that have been cut in the plate (50) that the belt (31) rides on. The slots allow the plenums (46) to deliver uniform heat over the entire width of the belt (31). Gas burners (52) provide the heat source and blowers (54) force the hot atmosphere, which is either neutral or rich in an oxidizing agent up through the slots, which hits the parts first, carrying the vaporizing lubricant out of the chamber. Temperature and velocity of the atmosphere delivered to the parts by the burner (52) and the blower (54) may be independently controlled for each plenum. The temperature range for the plenum is preferably 400 to 1600°F with a pressure range of 5 to 100 psi and a volume range of 20 to 2000 cfm.

After the parts have started to or have been delubricated, the parts enter zone 1 and move into the zone 2 to continue the delubrification process. Starting in zone 2 and through zone 3 the parts are pre-sintered. Finally, they enter the cooling zone.

Accordingly, it is to be understood that the embodiments of the invention herein described are merely illustrative of the application of the principles of the invention. Reference herein to details of the illustrated embodiments is not intended to limit the scope of the claims, which themselves recite those features regarded as essential to the invention.